

GENERAL NOTES

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LIFE HISTORY OF *PONTIA DAPLIDICE MOOREI* (RÖBER) (LEPIDOPTERA : PIERIDAE) FROM HIMACHAL PRADESH, INDIA

Butterflies are an important component of the overall biodiversity of a region. They occur in a variety of habitats and are of interest to biologists, naturalists, conservationists and entomologists for specific as well as general reasons. Adult butterflies and their early stages have dual economic importance because they are a significant component of the food chain, and are closely associated with different species of plants. The genus *Pontia* Fabricius is distributed over the entire Palearctic region, including most of Africa, and enters the north-western part of India. Three species are found in India: *P. daphidiae* (Linnaeus), *P. glauconome* Klug and *P. ehlroidiae* (Hübner) (Talbot, 1939). *Pontia daphidiae* (Linnaeus) is represented in the Indian region by only one subspecies, *P. d. moorei* (Röber). Mani (1962) reported *P. d. moorei* from Lahaul Valley (4300m).

This study was carried out at Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni (1440m), Solan, Himachal Pradesh, India. Oviposition on the leaves of *Lepidium ruderale* L. (Brassicaceae) was observed in the field. Freshly laid eggs were located and marked, and were observed daily until hatching. Newly hatched larvae were brought to the laboratory along with leaves, and kept in petri dishes/breeding cages. Fresh leaves were provided daily for the developing caterpillars. Observations on the development and habits were recorded. Measurements of head capsule width, and body length and width were made using with an ocular micrometer adapted to a stereomicroscope.

Oviposition behavior: Oviposition was observed from March to September 2002, between 1000 and 1600 hours, on *L. ruderale*, an herbaceous plant about one foot high. Prior to oviposition females fly slowly, quite close to the ground, and spend a good deal of time fluttering about in search of a suitable leaf. Eggs are placed singly on either the dorsal or ventral surface of tender leaves, each deposition taking three to five seconds. Females then fly off to locate another plant.

Egg (Fig.1): Height 0.87 ± 0.03 mm, width 0.34 ± 0.02 mm (n = 28); bottle shaped, upright, base comparatively broader and rounded; sculptured with prominent ridges, furrows and transverse striae; micropyle end narrow with small circular disc; shiny white when freshly laid, orange after one day, then turning blackish before hatching.

Incubation Period and Hatching: The egg incubation period is four days. The young larva emerges after chewing a hole in the micropyle end of the egg, then eats the egg shell. Hatching takes

about 1.2 hours and occurs mainly in the morning.

Larva: Number of instars: 4

First instar (duration = 2 days, Fig. 2). **Head:** Width 0.34 ± 0.02 mm (n = 26); black, with well defined, globular ocelli, and small primary setae. **Body:** Length 2.05 ± 0.04 mm, width 0.36 ± 0.04 mm (n = 26); pale yellow, distinctly segmented, small primary setae present on all segments; alimentary canal visible as dark green mid-dorsal stripe; entire body speckled with minute black dots, more dense laterally.

Second instar (duration = 2 days). **Head:** Width 0.70 ± 0.02 mm (n = 22); brownish-yellow, sparsely covered with moderately long secondary setae. **Body:** Length 4.46 ± 0.07 mm; width 0.83 ± 0.03 mm (n = 22); same as above except with greenish tinge between segments, and with mixture of white and black, primary and secondary setae.

Third instar (duration = 3 days, Fig. 3). **Head:** Width 1.73 ± 0.05 mm (n = 20); same as above except light green. **Body:** Length 8.30 ± 0.12 mm; width 1.64 ± 0.17 mm (n = 20); mid-dorsal stripe gray; dorsal stripes yellow; subdorsal stripes gray; and spiracular stripes yellow. All stripes extend for the full length of the body.

Fourth instar (duration = 4 days, n = 20, Fig. 4). Width 2.4 ± 0.05 mm (n = 20); creamish, sparsely covered with mixture of moderately long white and black setae; and with two lateral yellow patches. **Body:** Length 23.0 ± 0.47 mm; width 3.3 ± 0.12 mm (n = 20); same as above except gray stripes now broader than yellow stripes; spiracles white surrounded with prominent light green border.

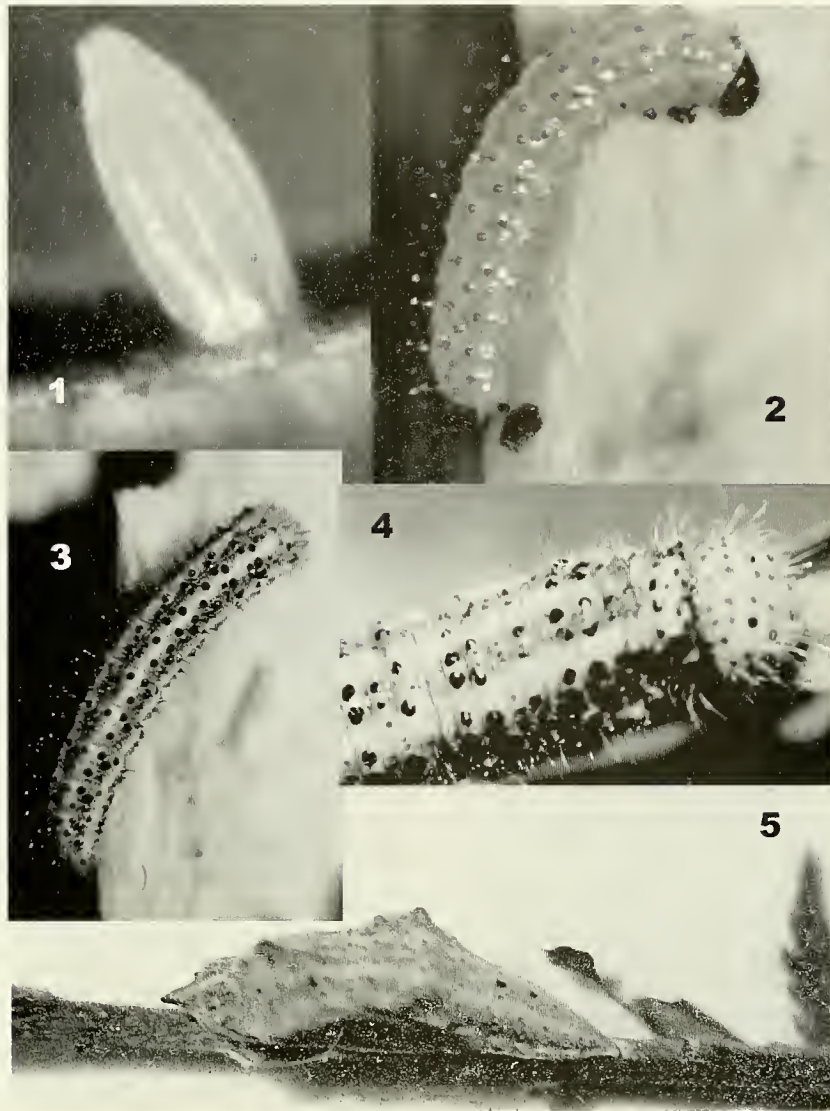
Pupa (duration = 6-7 days, Fig. 5) Length 18 ± 1 mm; width 4.2 ± 0.13 mm; tapering at both ends, with the anterior end drawn out to a spine like point; abdominal segmentation well defined; stripes as in 4th instar except the dorsal stripes now yellowish-green, and the spiracular yellow stripe extends from the posterior end to a point half the body length; spiracles white distinct; entire pupa held closely appressed to the stem or to the ceiling of the breeding chamber, by a well developed silk girdle around the thorax. Pupation took place either on the ceiling of the breeding cage or on the stem of the host plant. Larvae began preparation for pupation at night, and transformed to pupae 10 to 14 hours later.

Adult eclosion is completed within 1.5-2 hours, and usually take place in the morning.

Larval behavior: *Pontia daphidiae moorei* is monophagous on *L. ruderale*, and passes through four larval stadia. Each of the three larval ecdyses is completed in 5-9 hours. First instars eat their egg shells, then begin skeletonizing the tender leaves of their host plant, eating the leaf tissue except for the veins. Second instars eat tender leaves except midrib. Third and fourth instars devour the whole leaf including the midrib. First and second instars rest along the midrib on the upper surface of leaf, and third and fourth instars rest either on the stems or on the upper surface of the leaves.

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FIGURES 1-5. *Pontia daphidice moorei*. 1. Egg (ca. 50 \times). 2. First instar (ca. 40 \times). 3. Third instar (ca. 11 \times). 4. Final instar, head and body details (ca. 12 \times). 5. Pupa (ca. 3 \times).

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